

Restriction Requirement

With reference to the restriction requirement set forth in the Office Action at paragraphs 1-4 on page 2, Applicants hereby acknowledge that prior Examiner Alvin Grant previously imposed this restriction requirement by telephone, and hereby confirm Applicants' prior election by telephone of the claims in Group I (Claims 1-14). This was a provisional election, with traverse.

In regard to the non-elected claims, and with reference to paragraph 5 on pages 2-3 of the Office Action, Applicants note with appreciation that Examiner Renee Luebke has withdrawn the prior restriction requirement as to some of the non-elected claims (Claims 15-21), and has examined these claims on the merits. Applicants had intended to traverse the restriction requirement as to Claim 15-21, but since they have now been withdrawn from restriction and have been examined on the merits, a traverse of the restriction requirement is moot.

As to non-elected Claims 22-24, Applicants withdraw the prior traverse of the restriction requirement. The foregoing amendments cancel Claims 22-24, but Applicants reserve the right to file a divisional application presenting the subject matter of non-elected Claims 22-24 for examination on the merits.

Allowable Subject Matter

With reference to paragraph 10 on page 4 of the Office Action, Applicants note with appreciation the indication that Claims 10 and 20 recite subject matter which is considered to be patentably distinct from the prior art.

The Office Action indicated that Claims 10 and 20 would be allowed if rewritten in independent form, including all of the limitations of the base claim and any intervening claims.

Claims 10 and 20 have been amended so as to place each of these claims in independent form. Applicants wish to emphasize to the Examiner that the limitations added to each of Claims 10 and 20 are less than all of the limitations of the base claim and any intervening claims. Thus, Claims 10 and 20 are now broader than they were when the Examiner indicated that they were allowable. Nevertheless, Claims 10 and 20 still recite the distinctive subject matter which is not disclosed by the prior art. It is therefore respectfully submitted that Claims 10 and 20 should still be allowable, and notice to that effect is respectfully requested.

Applicants have added new Claims 25-31 and new Claims 32-36, which respectively depend from Claim 10 and Claim 20, and which should thus be allowable with Claims 10 and 20.

Comment on Statement of Reasons for Allowance

With reference to the last sentence in paragraph 10 on page 4, the Office Action sets forth a reason why Claims 10 and 20 are believed to be allowable. Applicants agree that Claims 10 and 20 are allowable. However, Applicants believe that the Examiner's statement should not be interpreted to mean that the stated reason is the only reason supporting the allowability of these claims, and that there are no other reasons which separately and independently support the allowability of these claims. Moreover, Applicants do not agree with the stated reason to the extent that it attempts to

paraphrase the subject matter recited in Claims 10 and 20, using terminology and/or language which differs in some respects from the specific terminology and language that was selected for use in Applicants' claims. Applicants believe that the scope and interpretation of the claims should be determined by the terminology and language of the claims themselves, rather than by language selected by the Examiner for the purpose of attempting to paraphrase the subject matter of the claims.

Independent Claim 1

The Office Action rejected Claim 1 under 35 U.S.C. §103, based on an assertion that Claim 1 would be obvious in view of a combination of teachings from (1) prior art disclosed in the present application and (2) Randall U.S. Patent No. 6,100,477.

The reliance on prior art disclosed in the present application is misplaced. In particular, the Office Action refers to "prior art discussed on page 1 of the present application" and goes on to assert that page 1 discloses a "base section, conductive part and a membrane". However, page 1 of the present application does not include any discussion of a base section, a conductive part, or a membrane. Moreover, even assuming that page 1 did disclose these features, there is no admission in the present application that anything discussed on page 1 constitutes "prior art" for purposes of 35 U.S.C. §102 or §103. The Office Action does not refer to pages 2-5 of the present application, where there is a discussion of some pre-existing devices, but it should be noted that the present application does not contain an

admission that anything discussed on pages 2-5 constitutes "prior art" for purposes of §102 or §103. Consequently, the combination rejection under §103 necessarily fails, because page 1 of the present application does not disclose any admitted prior art, much less the particular features mentioned in the Office Action. Accordingly, further discussion of the §103 rejection is not necessary. Nevertheless, in order to expedite examination of the present application, Applicants will voluntarily offer some brief comments regarding the Randall patent.

Figure 3 of the Randall patent discloses a MEMS switch having a membrane with flexible sections 36 disposed on opposite sides of a central portion 34. The flexible sections 36 are capable of flexing in a manner so that they effectively vary in size in a direction lengthwise of the membrane. As evident from Figure 3, each flexible section 36 is directly physically coupled at its outer end to a stationery structure which is part of a substrate 28. Stated differently, the flexible sections 36 serve as the outer ends of the membrane.

Independent Claim 1 has been amended so as to more clearly emphasize certain features which distinguish Claim 1 from the subject matter disclosed in Randall. Claim 1 recites a membrane which extends between first and second locations, and which has spaced first and second sections that each serve as resilient structure capable of yieldably varying in size in a direction lengthwise of the membrane. Claim 1 then goes on to recite that the membrane has:

outer portions that each extend a selected distance outwardly from a respective one of

said first and second sections to a respective one of said first and second locations in a direction approximately normal to a direction of movement of said conductive portion, said outer portions each being free of physical coupling to said base section except at a respective one of said first and second locations.

With reference to the lower left portion of Figure 9 in the present application, it will be noted that the disclosed membranes D, E, and F each have outer portions of the type recited in Claim 1, and that these outer portions progressively increase in size. In particular, as discussed in the paragraph bridging pages 21-22 of the present application, the outer portions of the membrane D each have a length of approximately 10 microns, the outer portions of the membrane E each have a length of approximately 30 microns, and the outer portions of the membrane F each have a length of approximately 50 microns.

With reference to the right side of the graph shown in Figure 13 of the present application, and the associated paragraph at lines 9-15 on page 23, it will be noted that, as the length of the outer portions is progressively increased, the membranes exhibit progressively less droop at higher temperatures, which is advantageous. In contrast, and as discussed above, Figure 3 of Randall shows a membrane in which the flexible sections 36 effectively serve as the outer ends of the membrane. The Randall membrane does not have any portions disposed outwardly of the flexible sections 36 which

would be structurally or functionally comparable to the "outer portions" recited in Claim 1 of the present application. Claim 1 is therefore believed to be patentably distinct from the device disclosed in the Randall patent, and notice to that effect is respectfully requested. (Applicants wish to add that the discussion here of certain disclosed embodiments from the present application, along with Figures 9 and 13, is provided solely by way of example, and is not intended to suggest any limitation to the scope of Claim 1).

Independent Claim 15

Independent Claim 15 is a method claim, and was subject to the same ground of rejection under 35 U.S.C. §103 as apparatus Claim 1. This §103 rejection fails, for the same reasons discussed above in association with Claim 1. In particular, the rejection is based on an assertion that page 1 of the present application discloses certain specified features and admits they are prior art, when in fact page 1 does not discuss those particular features, and in any event does not admit that anything discussed on page 1 is prior art. Consequently, further discussion of the §103 rejection is not necessary. Nevertheless, in order to expedite examination of the present application, Applicants will voluntarily offer some brief comments regarding why Claim 15 is patentably distinct from the Randall patent.

Claim 15 has been amended so as to more clearly emphasize certain features which clearly distinguish Claim 15 from the subject matter disclosed in Randall. In this regard, Claim 15 recites a membrane which extends between first and second locations, and which has first and second sections that

each serve as resilient structure capable of yieldably varying in size in a direction lengthwise of the membrane. Claim 15 goes on to recite that the membrane has:

outer portions that each extend a selected distance outwardly from a respective one of said first and second sections to a respective one of said first and second locations and that are each free of physical coupling to said base section except at a respective one of said first and second locations.

For the same basic reasons discussed above in association with Claim 1, it is respectfully submitted that the membrane of Randall does not have any portions that would be structurally or functionally comparable to the "outer portions" which are recited in Claim 15. Claim 15 is therefore believed to be patentably distinct from Randall, and notice to that effect is respectfully requested.

Dependent Claims

Claims 2, 4, 6-9, 11, 14 and 37 each depend directly or indirectly from independent Claim 1, and are also believed to be allowable over the art of record, for example for the same reasons discussed above in association with Claim 1. Claims 16, 18-19, 21 and 38 each depend directly or indirectly from independent Claim 15, and are also believed to be allowable over the art of record, for example for the same reasons discussed above in association with Claim 15.

Proposed Drawing Changes

Applicants are proposing corrections to each of Figures 9 and 13, and a red-marked copy of each of these figures is enclosed. The enclosed copy of Figure 13 is an enlarged version of Figure 13, so that the proposed changes marked thereon in red will be easier to see. Applicants are not proposing that Figure 13 be increased in size.

With reference to Figure 9, and in particular the lower left portion thereof, Applicants are proposing that six occurrences of the percent symbol ("%") be replaced by " μ m". As evident from the discussion of Figure 9 in the paragraph bridging pages 21-22 of the specification, the six numerical values in question are dimensions expressed in units of microns, rather than percentage values. Consequently, the proposed change to Figure 9 merely brings Figure 9 into conformity with the specification, and does not introduce any new matter into the disclosure of the present invention.

Turning to Figure 13, the legend on the right side of Figure 13 indicates that the curve "C" in the graph is distinguished by diamond-shaped symbols along its length, but the diamond-shaped symbols have been inadvertently omitted from the actual curve. Accordingly, Applicants are proposing that diamond-shaped symbols be added at spaced locations along the curve "C". In addition, in the portion of Figure 13 which is to the left of the temperature value of 80°C, it is noted that the symbols appearing along the top and bottom curves have been inadvertently swapped. In particular, the triangles disposed along the top curve need to be inverted, and the triangles disposed along the bottom curve also need to be

inverted (but only for the portion of each curve below a temperature of 80°C). It is respectfully submitted that these changes to Figure 13 do not introduce any new matter into the disclosure of the present invention. In this regard, MPEP §2163.07(a) specifies that:

By disclosing in a patent application a device that inherently performs a function or has a property, operates according to a theory or has an advantage, a patent application necessarily discloses that function, theory or advantage, even though it says nothing explicit concerning it. The application may later be amended to recite the function, theory or advantage without introducing prohibited new matter.

It is respectfully submitted that the curves shown in the graph of Figure 13 merely reflect the inherent operation of various membranes having the physical structure shown in Figure 9, and that inversion of the triangles along portions of two curves merely corrects the application in the manner permitted by MPEP §2163.07, so that the application properly discloses the function and operation which is inherent in each disclosed membrane, without introducing any new matter into the disclosure of the invention.

Applicants respectfully request approval of the proposed changes to Figures 9 and 13. If these changes are approved by the Examiner, formal drawings which include these changes will be submitted in due course.

Information Disclosure Statements

Applicants note that the Examiner has considered the first and second Information Disclosure Statements (IDSs) which were filed in the present application. Applicants have also filed a third IDS, which was mailed to the Patent Office on January 22, 2003, with a properly-executed first class mailing certificate bearing a date of January 22, 2003. The present Office Action was mailed two days later, on January 24, 2003. As a practical matter, the third IDS had probably not yet reached the desk of the Examiner as of the date that the Office Action was mailed. On the other hand, as a legal matter, and as discussed in MPEP §609(B)(1), the third IDS is considered to have an effective filing date which is the date appearing on its first-class mailing certificate. The effective date of the Office Action is its mailing date. Thus, the effective date of the third IDS is two days prior to the effective date of the Office Action. Consequently, as also discussed in MPEP §609(B)(1), the Office Action is required to reflect consideration of the third IDS.

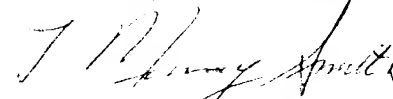
To the extent that the January 24 Office Action does not reflect consideration of the third IDS, the Office Action is incomplete. Applicants are sympathetic to the fact that this legal policy represents an inconvenience to the Examiner (in view of the practical delays which occur within the Postal Service and within the PTO before the third IDS actually reaches the desk of the Examiner). Consequently, in an attempt to expedite examination of the present application, Applicants are filing this Amendment in response to the Office Action. However, Applicants do not waive their objection to

the fact that, as a legal matter, the first Office Action was incomplete and thus defective. The Examiner's next communication should reflect consideration of the third IDS, and should not include any "final" ground of rejection.

Conclusion

Based on the foregoing, it is respectfully submitted that all of the pending claims are fully allowable, and favorable reconsideration of this application is therefore respectfully requested. If the Examiner believes that examination of the present application may be advanced in any way by a telephone conference, the Examiner is invited to telephone the undersigned attorney at (214) 953-6684.

Respectfully submitted,
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Date: April 2, 2003

Enclosures: Marked-Up Version of Amended Claims
Copy of Figures 9 and 13, with
proposed changes shown in red
Amendment Transmittal
Check (\$192.00)
Acknowledgment Post Card

MARKED-UP VERSION OF AMENDED CLAIMS

Please cancel Claims 3, 5, 12-13, 17 and 22-24 without prejudice.

10. (Amended) [An apparatus according to Claim 6,] An apparatus comprising a switch which includes:

a base section;

an electrically conductive part supported on said base section;

a membrane which has first and second ends respectively supported at spaced first and second locations on said base section, which has an electrically conductive portion disposed between said first and second ends thereof, which includes first and second sections disposed on opposite sides of said conductive portion, and which is capable of resiliently flexing so that said membrane can move from a first position where said membrane is substantially unflexed and said conductive portion is spaced from said conductive part to a second position where said membrane is flexed and said conductive portion is adjacent said conductive part;

wherein as said membrane moves from said first position to said second position, said [membrane] first and second sections engage said base section before said conductive portion reaches said position adjacent said conductive part, and then a central portion of said membrane between said [expansion] first and second sections flexes to effect movement of said conductive portion to said position adjacent said conductive part.

25. (New) An apparatus according to Claim 10, wherein said first and second sections of said membrane are flexible and capable of yieldably varying in size in a direction lengthwise of said membrane in a manner so as to vary an effective length of said membrane.

26. (New) An apparatus according to Claim 25, wherein said first and second sections each include a membrane section which extends transversely of said membrane and has an approximately U-shaped profile.

27. (New) An apparatus according to Claim 26, wherein when said membrane is in said first position, said U-shaped profile of each said membrane section includes spaced first and second portions which are approximately straight and extend approximately parallel to each other, and includes a third portion which is approximately straight and extends between ends of said first and second portions approximately perpendicular thereto.

28. (New) An apparatus according to Claim 27, wherein in each said membrane section, said first and second portions thereof tilt with respect to said third portion thereof in response to exertion on said membrane of one of a lengthwise contraction force and a lengthwise expansion force.

29. (New) An apparatus according to Claim 27, wherein in each said membrane section, said first and second portions thereof extend from opposite ends of said third portion thereof in a direction away from said base section.

30. (New) An apparatus according to Claim 10, wherein said membrane has outer portions which each extend outwardly from a respective one of said first and second sections on a side thereof opposite from said central portion, said central portion and said outer portions being approximately co-planar when said membrane is in said first position.

31. (New) An apparatus according to Claim 10, including a circuit operable for applying between said electrically conductive part and said electrically conductive portion a first voltage which effects movement of said membrane from said first position to said second position, and for thereafter applying between said electrically conductive part and said electrically conductive portion a second voltage which is less than said first voltage and which is sufficient to maintain said membrane in said second position thereof.

20. (Amended) [A method according to Claim 18, including the steps of:] A method of switching through use of a switch which includes a base section, an electrically conductive part supported on said base section, and a membrane having first and second ends respectively supported at spaced first and second locations on said base section, and having an electrically conductive portion disposed between said first and second ends, comprising the steps of:

configuring said membrane to have first and second sections which are disposed between said ends thereof on opposite sides of said electrically conductive portion; and

responding to an applied voltage between said conductive part and said conductive portion by resiliently flexing said membrane so that said membrane moves from a first position where said membrane is substantially unflexed and said conductive portion is spaced from said conductive part to a second position where said membrane is flexed and said conductive portion is adjacent said conductive part, including the steps of:

causing said [membrane] first and second sections to engage said base section during movement of said membrane toward said second position before said membrane reaches said second position; and

thereafter flexing a central portion of said membrane disposed between said [expansion] first and second sections thereof to effect movement of said conductive portion to said position adjacent said conductive part.

32. (New) A method according to Claim 20, including the steps of:

configuring said first and second sections to be flexible and capable of yieldably varying in size in a direction lengthwise of said membrane; and

effecting expansion of said first and second sections as said membrane is moved from said first position to said second position.

33. (New) A method according to Claim 32, including the step of configuring each of said first and second sections to include a membrane section which extends transversely of said membrane and which has approximately a U-shaped profile.

34. (New) A method according to Claim 33, including the step of configuring each said membrane section so that, when said membrane is in said first position, said U-shaped profile thereof includes spaced first and second portions which are approximately straight and extend approximately parallel to each other, and includes a third portion which is approximately straight and extends between ends of said first and second portions approximately perpendicular thereto.

35. (New) A method according to Claim 34, including for each said membrane section the step of causing each of said first and second portions thereof to tilt with respect to said third portion thereof in response to the application to said membrane of one of a lengthwise expansion force and a lengthwise contraction force.

36. (New) A method according to Claim 20, including the step of effecting application of said applied voltage between said electrically conductive part and said electrically conductive portion by applying therebetween a first voltage which effects movement of said membrane from said first position to said second position, and thereafter applying therebetween a second voltage which is lower than said first voltage and which is sufficient to maintain said membrane in said second position thereof.

1. (Amended) An apparatus comprising a switch which includes:

a base section;

an electrically conductive part supported on said base section; and

a membrane which has first and second ends respectively supported at spaced first and second locations on said base section, which has an electrically conductive portion disposed between said first and second ends [thereof], which [includes] has spaced first and second sections that are disposed between said first and second ends on opposite sides of said conductive portion and that each serve as resilient structure capable of yieldably [expanding] varying in size in a direction lengthwise of said membrane [in a manner so as to increase an effective length of said membrane], and which is capable of resiliently flexing so that said membrane can move from a first position where said membrane is substantially unflexed and said conductive portion is spaced from said conductive part to a second position where said membrane is flexed and said conductive portion is adjacent said conductive part, said membrane having outer portions that each extend a selected distance outwardly from a respective one of said first and second sections to a respective one of said first and second locations in a direction approximately normal to a direction of movement of said conductive portion, said outer portions each being free of physical coupling to said base section except at a respective one of said first and second locations.

2. An apparatus according to Claim 1, including a dielectric layer disposed over said conductive part, said membrane engaging a side of said dielectric layer opposite

from said conductive part when said membrane is in said second position.

4. (Amended) An apparatus according to Claim [3] 1, wherein each [said expansion section] of said first and second sections includes a membrane section which extends transversely of said membrane and has an approximately U-shaped profile.

6. An apparatus according to Claim 4, wherein when said membrane is in said first position, said U-shaped profile of each said membrane section includes spaced first and second portions which are approximately straight and extend approximately parallel to each other, and includes a third portion which is approximately straight and extends between ends of said first and second portions approximately perpendicular thereto.

7. An apparatus according to Claim 6, wherein said first and second portions of each said membrane section tilt with respect to said third portion thereof in response to exertion on said membrane of one of a lengthwise contraction force and a lengthwise expansion force.

8. An apparatus according to Claim 6, wherein said first and second portions of each said membrane section extend from opposite ends of said third portion thereof in a direction toward said base section.

9. An apparatus according to Claim 6, wherein said first and second portions of each said membrane section extend from opposite ends of said third portion thereof in a direction away from said base section.

37. (New) An apparatus according to Claim 1, wherein as said membrane moves from said first position to said second position, said first and second sections engage said base section before said conductive portion reaches said position adjacent said conductive part, and then a central portion of said membrane between said first and second sections flexes to effect movement of said conductive portion to said position adjacent said conductive part.

11. (Amended) An apparatus according to Claim [4] 1, wherein said membrane has a central portion extending between said [expansion] first and second sections, [and has outer portions which each extend outwardly from a respective said expansion section on a side thereof opposite from said central portion,] said central portion and said outer portions being approximately co-planar when said membrane is in said first position.

14. An apparatus according to Claim 1, including a circuit operable for applying between said electrically conductive part and said electrically conductive portion a first voltage which effects movement of said membrane from said first position to said second position, and for thereafter applying between said electrically conductive part and said electrically conductive portion a second voltage

which is less than said first voltage and which is sufficient to maintain said membrane in said second position thereof.

15. (Amended) A method of switching through use of a switch which includes a base section, an electrically conductive part supported on said base section, and a membrane having first and second ends respectively supported at spaced first and second locations on said base section, and having an electrically conductive portion disposed between said first and second ends thereof, comprising the steps of:

[providing] configuring said membrane to include spaced first and second sections that are disposed between said first and second ends of said membrane on opposite sides of said conductive portion and that each serve as resilient structure which is capable of yieldably [expanding] varying in size in a direction lengthwise of said membrane [so as to increase an effective length of said membrane];

configuring said membrane to include outer portions that each extend a selected distance outwardly from a respective one of said first and second sections to a respective one of said first and second locations and that are each free of physical coupling to said base section except at a respective one of said first and second locations; and

responding to an applied voltage between said conductive part and said conductive portion by resiliently flexing said membrane so that said membrane moves from a first position where said membrane is unflexed and said conductive portion is spaced from said conductive part to a second position where said membrane is flexed and said conductive portion is adjacent said conductive part, [including the step of

effecting expansion of said resilient structure as said membrane is moved from said first position to said second position] said outer portions each extending in a direction which is approximately normal to a direction of movement of said conductive portion.

16. (Amended) A method according to Claim 15, including the steps of:

configuring said membrane so that [said resilient structure thereof includes two expansion sections disposed on opposite sides of said conductive portion, each said expansion section including] said first and second sections each include a membrane section which extends transversely of said membrane and which has approximately a U-shaped profile; and

effecting expansion of each of said [expansion] first and second sections as said membrane is moved from said first position to said second position.

18. (Amended) A method according to Claim 16, including the step of configuring each said membrane section so that, when said membrane is in said first position, said U-shaped profile thereof includes spaced first and second portions which are approximately straight and extend approximately parallel to each other, and includes a third portion which is approximately straight and [extend] extends between ends of said first and second portions approximately perpendicular thereto.

19. A method according to Claim 18, including the step of causing each of said first and second portions of each said

membrane section to tilt with respect to said third portion thereof in response to the application to said membrane of one of a lengthwise expansion force and a lengthwise contraction force.

38. (New) A method according to Claim 15, including the steps of:

causing said first and second sections to engage said base section during movement of said membrane toward said second position before said membrane reaches said second position; and

thereafter flexing a central portion of said membrane disposed between said first and second sections thereof to effect movement of said conductive portion to said position adjacent said conductive part.

21. A method according to Claim 15, including the step of effecting application of said applied voltage between said electrically conductive part and said electrically conductive portion by applying therebetween a first voltage which effects movement of said membrane from said first position to said second position, and thereafter applying therebetween a second voltage which is lower than said first voltage and which is sufficient to maintain said membrane in said second position thereof.